

1. A method of enhancing binding of a binding compound to a target site in a patient comprising

5 providing to said patient an effective amount of a physiologically acceptable organized mobile multicomponent conjugate (OMMC) assembly comprising a lamellar structure defining a void and having incorporated at least first and second binding compounds capable of binding to at least first and second affinity sites in said target site, wherein a position of said first and second binding compounds relatively self-adjust to form an OMMC ensemble resulting in enhanced binding of said binding compounds to said affinity sites.

2. The method of claim 1 wherein said assembly further comprises an agent.

3. The method of claim 2 wherein said agent is selected from the group consisting of a diagnostic agent and a therapeutic agent.

4. The method of claim 2 wherein said agent is attached to the assembly.

5. The method of claim 2 wherein said agent is contained within the assembly.

6. The method of claim 1 wherein said target site is a cell selected from the group consisting of tumor cells, macrophages, endothelial cells, myocardial cells, hepatocytes, leukocytes, platelets and combinations thereof.

7. The method of claim 3 further comprising thereafter performing a procedure on said patent.

8. The method of claim 1 wherein said binding compound is a ligand.

9. The method of claim 8 wherein the ligand is selected from the group consisting of a selectin, a selectin mimetic, a glycan binding protein, and combinations thereof.

10. The method of claim 1 wherein said first and second binding compounds are different.

11. A physiologically acceptable target binding composition comprising an organized mobile multicomponent conjugate (OMMC) assembly and a physiologically acceptable carrier or excipient, said assembly comprising a lamellar structure defining a void and having at least first mobile and second mobile binding compounds complementary to affinity sites on a target, said first and second binding compounds bound to said lamellar structure at first and second structure binding sites, said first and second structure binding sites being relatively adjustable within said lamellar structure.
12. The composition of claim 11 further comprising a linker between said first structure binding site and said first binding compound and said second structure binding site and said second binding compound.
13. The composition of claim 11 further comprising an agent.
14. The composition of claim 13 wherein said agent is selected from the group consisting of a therapeutic agent and a diagnostic agent.
15. The composition of claim 11 wherein said binding compounds are selected from the group consisting of an anionic compound, a saccharide, and combinations thereof.
16. The composition of claim 12 wherein said linker is a polyhydroxylated compound.

17. The composition of claim 11 having a size less than five microns.

10/13/69

18. A method of enhancing the affinity of binding compounds to a target site in a patient comprising

providing to said patient an effective amount of a physiologically acceptable organized mobile multicomponent conjugate (OMMC) assembly

5 comprising a lamellar structure defining a void and having incorporated at least two binding compounds B^1 and B^2 bound to said structure at regions A^1 and A^2 via linkers L^1 and L^2 , B^1 and B^2 capable of binding to at least first and second affinity sites in said target site, wherein a position of B^1 and B^2 relatively self-adjust to form an OMMC ensemble resulting in enhanced binding of B^1 and B^2 to said
10 affinity sites.

19. The method of claim 18 wherein said target is selected from the group consisting of tumor cells, thrombi, monocytes, macrophages, eosinophils, neutrophils, lymphocytes, vascular endothelium, myocardial cells, hepatocytes, and an extracellular matrix surrounding any of these cells.

20. The method of claim 18 wherein A^1 and A^2 may be the same or different and are selected from the group consisting of $CH_3(CH_2)_a-W$, $CH_3(CH_2)_a-O-(CH_2)_b-W$, $CH_3(CH_2)_a-S-(CH_2)_b-W$, and $R^1O_2CCH_2(CW)CO_2R^1$, wherein a and b range from 16 to 24, W is $-O-$, $-O_2C-$, $-CO_2-$, and $-NHCO-$.

21. The method of claim 18 wherein B^1 and B^2 may be the same or different and are selected from the group consisting of glucose, galactose, fucose, sialic acid, and carminic acid.

22. The method of claim 18 wherein L^1 and L^2 may be the same or different and are selected from the group consisting of polyethylene glycol having a molecular weight in the range of 1,000 to 4,000.

23. The method of claim 18 wherein the lamellar structure is selected from the group consisting of $CH_3-(CH_2)_e-X$, $CH_3-(CH_2)_fCONH(CH_2)_g-X$, $CH_3-(CH_2)_fNHCONH(CH_2)_g-X$, $CH_3-(CH_2)_fOCONH(CH_2)_g-X$, $CH_3-(CH_2)_fNH(CH_2)_g-X$, $R^2O_2CCH_2(CY)CO_2R^2$, and $R^2O_2CCH_2CH_2(CY)CO_2R^2$ where X is selected from the group consisting of carboxylate, sulfate, or phosphate; Y is selected from the group consisting of $-(CH_2)_k-X$, $-NHCO(CH_2)_k-X$, and $CH_2OCO(CH_2)_2-CO_2^-$; R^2 is a normal alkyl radical containing 16-24 carbon atoms, and e, f, g, and k range from 1 to 5.

24. The method of claim 18 wherein the binding compounds have an affinity equal to or less than about 100 nM for the target.

25. The method of claim 18 wherein A^1 and A^2 may be the same or different and are selected from the group consisting of $CH_3(CH_2)_a-W$, $CF_3(CH_2)_a-W$, $CF_3(CF_2)_a-W$, $CF_3(CF_2)_aCH_2CH_2-W$, $CH_3(CH_2)_a-O-(CH_2)_b-W$, $CF_3(CF_2)_a-O-(CH_2)_b-W$, $CH_3(CH_2)_a-S-(CH_2)_b-W$, $CH_3(CH_2)_a-S-S-(CH_2)_b-W$ and $R^1O_2CCH_2(CW)CO_2R^1$, wherein a and b range from 16 to 32; W is a connector unit selected from the group consisting of $-O-$, $-CO-$, $-CO_2-$, $-O_2C-$, $-O_2CO-$, $-NHCO-$, $-S-$, $-SO-$, $-SO_2-$, $-OSO-$, $-OSO_2-$, $-NHSO_2-$, $-PO_2-$, and $-OPO_2-$; and R^1 is a normal alkyl radical containing 16-24 carbon atoms.

26. The method of claim 18 where B¹ and B² may be the same or different and are selected from the group consisting of amino acids; peptides containing 1-20 amino acid residues; flavenoids; isoflavones; C- or O-monosaccharides and glycosides selected from the group consisting of glucose, mannose, fucose, galactose, glucosamine, mannosamine, galactosamine, and sialic acid; oligosaccharides containing 1-10 furanose or pyranose units; C- or O-glucosides selected from the group consisting of rutin, neohesperidin dihydrochalone, phloridizin, hesperidin, hesperidin methyl chalcone, naringenin, and esculin; and carminic acids selected from the group consisting of carmine and 18b-glycyrrhetic acid.

27. The method of claim 18 where L¹ and L² may be the same or different neutral polymers or copolymers with a molecular weight in the range of 1,000 to 10,000 daltons selected from the group consisting of polyethyleneglycols, polysorbates, polyglycerols, polyvinylalcohols, polyglycolates, and polylactates.

28. The method of claim 18 where the lamellar structure is selected from the group consisting of CH₃-(CH₂)_e-X, CH₃-(CF₂)_e-X, CF₃-(CF₂)_e-X, CF₃-(CF₂)_f-O-(CH₂)_g-X, CH₃-(CH₂)_f-S-(CH₂)_g-X, CH₃-(CH₂)_f-S-S-(CH₂)_g-X, CH₃-(CH₂)_gCO₂(CH₂)_h-X, CH₃-(CH₂)_fCONH(CH₂)_g-X, CH₃-(CH₂)_fNHCONH(CH₂)_g-X, CH₃-(CH₂)_fOCONH(CH₂)_g-X, CH₃-(CH₂)_fNH(CH₂)_g-X, CH₃-(CH₂)_fN[(CH₂)_g]₂-X, CH₃-(CH₂)_fSO(CH₂)_g-X, CH₃-(CH₂)_fSO₂(CH₂)_g-X, CH₃-(CH₂)_mNH(CH₂)_fCO₂(CH₂)_g-X, CH₃-[(CH₂)_f]₂N(CH₂)_gCONH(CH₂)_h-X, R²O₂CCH₂(CY)CO₂R², R²O₂CCH₂CH₂(CY)CO₂R², where X is selected from the group consisting of carboxylate, sulfonate, sulfate, phosphate, and phosphonate; Y is -(CH₂)_k-X, -NHCO(CH₂)_k-X, -OCO(CH₂)_k-X,

-40-

$-\text{CH}_2\text{OCO}(\text{CH}_2)_2-\text{CO}_2^-$; e = 16-32; f, g, h = 1-15; R^2 is a normal alkyl radical containing 16-24 carbon atoms; and k = 1-6.

29. A method of performing a diagnostic or a therapeutic procedure on a patient using a target binding composition comprising

providing to said patient an effective amount of a physiologically acceptable composition comprising an organized mobile multicomponent conjugate (OMMC) assembly comprising a lamellar structure defining a void and having incorporated at least two binding compounds B^1 and B^2 bound to said structure by anchor regions A^1 and A^2 via linkers L^1 and L^2 , and an effector molecule, said B^1 and B^2 capable of binding to at least first and second affinity sites in said target site, wherein a position of B^1 and B^2 relatively self-adjust to form an OMMC ensemble resulting in enhanced binding of B^1 and B^2 to said affinity sites, and

performing said diagnostic or said therapeutic procedure on said patient.

30. The method of claim 29 wherein A^1 and A^2 may be the same or different and are selected from the group consisting of $CH_3(CH_3)_a-W$, $CF_3(CH_2)_a-W$, $CF_3(CF_2)_a-W$, $CF_3(CF_2)_aCH_2CH_2-W$, $CH_3(CH_2)_a-O-(CH_2)_b-W$, $CF_3(CF_2)_a-O-(CH_2)_b-W$, $CH_3(CH_2)_a-S-(CH_2)_b-W$, or $CH_3(CH_2)_a-S-S-(CH_2)_b-W$, wherein a and b range from 16 to 32 and W is a connector unit selected from the group consisting of $-O-$, $-CO_2-$, $-O_2C-$, $-O_2CO-$, $-CO-$, $-NHCO-$, $-S-$, $-SO-$, $-SO_2-$, $-OSO-$, $-OSO_2-$, $-NHSO_2-$, $-PO_2-$, and $-OPO_2-$.

31. The method of claim 29 wherein B^1 and B^2 may be the same or different C-or O-monosaccharides and glycosides selected from the group consisting of glucose, mannose, fucose, galactose, glucosamine, mannosamine, galactosamine, and sialic acid, oligosaccharides containing 1 to 10 furanose or pyranose units, amino acids, peptides containing 1 to 20 amino acid residues, flavonoids and isoflavonones C- or O- glucosides selected from the group consisting of rutin, neohesperidin dihydrochalcone, phloridizin, hesperidin, hesperidin methyl chalcone, naringenin, and esculin, carminic acids selected from the group consisting of carmine, and 18b-glycyrrhetic acid.

32. The method of claim 29 wherein L^1 and L^2 may be the same or different neutral polymers or copolymers selected from the group consisting of polyethyleneglycol, polysorbates, polyglycerols, polyvinylalcohols, polyglycolate, and polylactate wherein the molecular weight of the said polymer and copolymer range from 1,000 to 10,000.

33. The method of claim 29 wherein said lamellar structure is selected from the group consisting of $\text{CH}_3-(\text{CH}_2)_e-\text{X}$, $\text{CH}_3-(\text{CF}_2)_e-\text{X}$, $\text{CF}_3-(\text{CF}_2)_e-\text{X}$, $\text{CF}_3-(\text{CF}_2)_f-\text{O}-(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f-\text{S}-(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f-\text{S}-\text{S}-(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_g\text{CO}_2(\text{CH}_2)_h-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{CONH}(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{NHCONH}(\text{CH}_2)_g-\text{X}$,
5 $\text{CH}_3-(\text{CH}_2)_f\text{OCONH}(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{NH}(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{N}[(\text{CH}_2)_g]_2-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{SO}_2(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{SO}_2(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{N}[(\text{CH}_2)_g]_2-\text{X}$, $\text{CH}_3-(\text{CH}_2)_m\text{NH}(\text{CH}_2)_f\text{CO}_2(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-((\text{CH}_2)_f)_2\text{N}(\text{CH}_2)_g\text{CONH}(\text{CH}_2)_h-$, $\text{RO}_2\text{CCH}_2(\text{CY})\text{CO}_2\text{R}$, wherein f, g, and h range from 1 to 5; X is selected from the group consisting of carboxylate, sulfonate, sulfate, phosphate, and phosphonate;
10 Y is selected from the group consisting of $-(\text{CH}_2)_k-\text{X}$, $-\text{NHCO}(\text{CH}_2)_k-\text{X}$, $-\text{OCO}(\text{CH}_2)_k-\text{X}$, $-\text{CH}_2\text{OCO}(\text{CH}_2)_2-\text{CO}_2^-$; R is a normal alkyl radical containing 16 to 24 carbon atoms; and k varies from 2 to 6.

34. The method of claim 29 wherein A^1 and A^2 may be the same or different and are selected from the group consisting of $\text{CH}_3(\text{CH}_2)_a-\text{W}$, $\text{CH}_3(\text{CH}_2)_a-\text{O}-(\text{CH}_2)_b-\text{W}$, $\text{CH}_3(\text{CH}_2)_a-\text{S}-(\text{CH}_2)_b-\text{W}$, and $\text{R}^1\text{O}_2\text{CCCH}_2(\text{CW})\text{CO}_2\text{R}^1$, wherein a and b range from 16 to 24, W is $-\text{O}-$, $-\text{O}_2\text{C}-$, $-\text{CO}_2-$, and $-\text{NHCO}-$.

35. The method of claim 29 wherein B^1 and B^2 may be the same or different and are selected from the group consisting of glucose, galactose, fucose, sialic acid and carminic acid.

36. The method of claim 29 wherein L^1 and L^2 may be the same or different and is polyethylene glycol having a molecular weight in the range of 1,000 to 4,000.

37. The method of claim 29 wherein said lamellar structure is a compound selected from the group consisting of $\text{CH}_3-(\text{CH}_2)_e-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{CONH}(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{NHCONH}(\text{CH}_2)_g-\text{X}$, $\text{CH}_3-(\text{CH}_2)_f\text{OCONH}(\text{CH}_2)_g-$, $\text{CH}_3-(\text{CH}_2)_f\text{NH}(\text{CH}_2)_g-$, $\text{R}^2\text{O}_2\text{CCH}_2(\text{CY})\text{CO}_2\text{R}^2$, and $\text{R}^2\text{O}_2\text{CCH}_2\text{CH}_2(\text{CY})\text{CO}_2\text{R}^2$; R^2 is a normal alkyl radical containing 16 to 24 carbon atoms; X is selected from the group consisting of carboxylate, sulfate, or phosphate; Y is selected from the group consisting of $-(\text{CH}_2)_k-\text{X}$, $-\text{NHCO}(\text{CH}_2)_k-\text{X}$ and $\text{CH}_2\text{OCO}(\text{CH}_2)_2-\text{CO}_2^-$; e ranges from 16 to 32, and f, g, and k range from 1 to 5.

38. The method of claim 29 wherein said effector molecule is selected from the group consisting of an echogenic agent, a radionuclide, a paramagnetic agent, an optical agent, and a cytotoxic agent.

39. The method of claim 38 wherein said effector molecule is an echogenic agent selected from the group consisting of perfluoropropane, perfluorobutane, sulfur hexafluoride, tetrafluoromethane, hexafluoroethane, octafluoropropane, decafluorobutane, dodecafluoropentane, and perfluorohexane.

40. The method of claim 38 wherein said effector molecule is a radionuclide selected from the group consisting of I-123, I-131, Tc-99m, Re-186, Re-188, SM-152, Ho-155, Bi-202, and Lu-157.

41. The method of claim 38 wherein said effector molecule is a paramagnetic agent selected from the group consisting of Gd-DTPA, Gd-DOTA, Gd-DTPA-*bis*(methoxyethyl)amide, and Mn-EDTA.

42. The method of claim 38 wherein said effector molecule is an optical agent selected from the group consisting of a fluorophore that absorbs light in the range of 300 - 1200 nm, and a chromophore that absorbs light in the range of 300 - 1200 nm.

43. The method of claim 38 wherein said effector molecule is a cytotoxic agent selected from the group consisting of fluorouracil, fluorouridine, sulfisoxazole, N'-(w-thiazolyl)sulfanilamide, sulfmethoxazole, and sulfisomidine.

44. The method of claim 38 wherein said effector molecule is an optical agent selected from the group consisting of fluorescein and indocyanine green.

45. The method of claim 38 wherein said effector molecule is perfluorobutane.

46. The method of claim 38 wherein said effector molecule is I-131 or Tc-99m.

47. The method of claim 38 wherein said target is selected from the group consisting of tumor cells, thrombi, monocytes, macrophages, eosinophils, neutrophils, lymphocytes, vascular endothelium, myocardial cells, hepatocytes, and an extracellular matrix surrounding any of the said cells.